ISSN (print) 0093-4666 © 2015. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

http://dx.doi.org/10.5248/130.775

Volume 130, pp. 775–781 *July–September 2015*

New species of *Phaeomonilia* and *Mirandina* from dead branches in China

Ying-Rui Ma[1], Ji-Wen Xia[1], Xiu-Guo Zhang[1*],
& Rafael F. Castañeda-Ruiz[2]

[1]*Department of Plant Pathology, Shandong Agricultural University, Taian, 271018, China*
[2]*Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro de Humboldt" (INIFAT), Calle 1 Esq. 2, Santiago de Las Vegas, C. Habana, Cuba, C.P. 17200*
*Correspondence to: *zhxg@sdau.edu.cn, sdau613@163.com*

Abstract — Two new hyphomycetes, *Phaeomonilia guangxiensis* and *Mirandina inaequalis,* are described and illustrated from specimens collected on dead branches in Guangxi Province, China. *Phaeomonilia guangxiensis* is distinguished by its globose unicellular colorless conidia formed by thallic disarticulation of fertile branches on macronematous conidiophores. *Mirandina inaequalis* differs from other described *Mirandina* species by its mostly 3-septate cylindrical conidia and conspicuous denticles on the conidiogenous cell.

Key words — anamorphic fungi, taxonomy

Introduction

There is enormous diversity of anamorphic fungi growing on rotten wood and dead branches in tropical forests, and several novel taxa have been recently discovered from forest ecosystems of southern China (Dai et al. 2009; Zhang et al. 2009, 2012; Dai & Li 2010; Ma et al. 2011, 2012a,b; Ren et al. 2012). During ongoing mycological surveys in a nature reserve of Guangxi Province, China, two interesting hyphomycetes were collected on dead branches. Morphological and developmental characteristics suggest their placement in *Phaeomonilia* and *Mirandina*. Both differ from previously described taxa and therefore are proposed as new to science.

Materials & methods

Samples of decaying wood were collected from subtropical forests of Guangxi Province, China, placed in separate zip-lock plastic bags, and taken to the laboratory. They were then incubated at 27°C for more than 2 weeks in an artificial climate box in 9 cm diameter plastic Petri dishes containing moistened filter paper. Samples were examined through an Olympus SZ61 dissection microscope. All microscopic characteristics

were determined at 60× and 100× magnification (Olympus BX51 microscope) and are based on 50 mature conidia and 30 conidiophores mounted in lactophenol. Specimens were deposited in the Herbarium of Shandong Agricultural University, Taian, China (HSAUP) and the Mycological Herbarium, Institute of Microbiology, Chinese Academy of Sciences, Beijing, China (HMAS).

Taxonomy

Phaeomonilia guangxiensis Y.R. Ma & X.G. Zhang, **sp. nov.** Fig. 1

MycoBank MB 814054

Differs from *Phaeomonilia pleiomorpha* by its larger conidia; and from *P. corticola* by its wider, globose conidia.

Type: China, Guangxi Province: Dayaoshan Nature Reserve, 23°40′N 109°50′E, alt. 550 m, on dead branches of an unidentified broadleaf tree, 9 Oct. 2012, Y.R. Ma (**Holotype**, HSAUP H4040; **isotype**, HMAS 243455).

Etymology: refers to the province where the type was found.

Colonies on the natural substratum effuse, brown, consisting of individual brown conidiophores over the substratum surface. Mycelium mostly superficial but some immersed; superficial hyphae pale brown, cylindrical, smooth, septate, branched. Conidiophores macronematous, mononematous, erect, straight or flexuous, cylindrical, septate, smooth, ≤405 µm tall, 7.5–11.5 µm wide at the base, brown to dark brown, mostly dichotomously branched towards the apex. Conidiogenous cells enterogenous, determinate, inwardly curved, colorless, smooth, lageniform, to subulate. Ramoconidia and conidia thallic-arthric, catenate, ellipsoid to globose, broadly Y-shaped, 7–11 × 11–14.5 µm, unicellular, colorless, dry, smooth, forming by disarticulation of the conidiogenous branches.

Comments – The genus *Phaeomonilia* was established by Castañeda-Ruíz et al. (2007) with two species: *P. pleiomorpha* R.F. Castañeda et al. (type species) and *P. corticola* (R.F. Castañeda) R.F. Castañeda et al. [≡ *Monilia corticola* R.F. Castañeda]. *Phaeomonilia* was mainly characterized by macronematous conidiophores with globose, unicellular, colorless conidia formed by thallic disarticulation of fertile branches and by the *Stylaspergillus*-like synanamorph. The genus is similar to *Botryomonilia* Goos & Piroz. (Goos & Pirozynski 1975) in its branching system, narrowing progressively towards the apex before the maturation and fragmentation or disarticulation process that produces the thallic-arthric conidia, as described by Kendrick (2003). *Botryomonilia*, however, has conidia connected by an isthmus (Castañeda-Ruíz et al. 2007). *Phaeomonilia pleiomorpha* differs from *P. guangxiensis* by its smaller conidia (4.0–5.8 × 3.9–4.4 µm) and its *Stylaspergillus*-like synanamorph, and *P. corticola* differs by its narrower ellipsoid to doliiform conidia (5.5–16.0 × 4–5 µm; Castañeda-Ruíz et al. 2007).

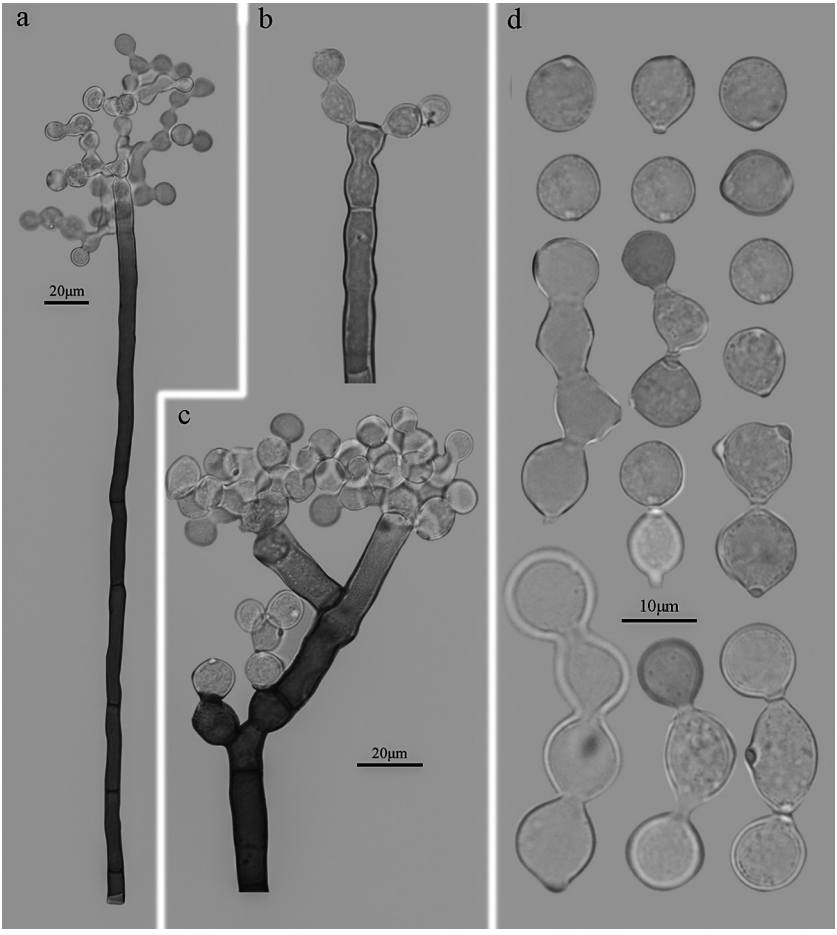

Fig. 1. *Phaeomonilia guangxiensis* (holotype, HSAUP H4040). a. Conidiophore and conidia. b, c. Conidiogenous cells and conidia. d. Conidia.

Key to species of *Phaeomonilia*

1. *Stylaspergillus*-like synanamorph present ..... *P. pleiomorpha*
1. No synanamorph present 2
2. Conidia doliiform or ellipsoid ..... *P. corticola*
2. Conidia globose ..... ***P. guangxiensis***

Mirandina inaequalis Y.R. Ma & X.G. Zhang, **sp. nov.** Fig. 2

MycoBank MB 814055

Differs from other *Mirandina* species by its cylindrical and mostly 3-septate conidia.

Type: China, Guangxi Province: Guposhan Nature Reserve, 24°34′N 111°30′E, alt. 600 m, on dead branches of an unidentified broadleaf tree, 9 Oct. 2012, Y.R. Ma (**Holotype**, HSAUP H4039; **isotype**, HMAS 243456).

Etymology: refers to the unequal length of the conidia.

Colonies effuse on the natural substratum, brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth-walled hyphae. Conidiophores macronematous, mononematous, single or in small groups, unbranched, erect, straight or flexuous, 5–7-septate, smooth, brown at the base and becoming almost colorless towards the apex, thin-walled, 75–220 × 3.5–6.5 µm. Conidiogenous cells polyblastic, integrated, terminal, becoming intercalary, almost colorless, with short-cylindrical denticles in the upper region, conical at the apex. Conidial secession schizolytic. Conidia holoblastic, solitary, acropleurogenous, dry, narrow, obclavate, fusiform or cylindrical, subhyaline to hyaline, 1–3-septate, mostly 3-septate, 16–24.5 × 2.5–5 µm wide in the broadest part, apex rounded, base truncate with a protuberance.

Comments – Arnaud (1952) introduced the genus *Mirandina* but did not provide a Latin diagnosis. Matsushima (1971) provided a Latin diagnosis but failed to name a type species. The generic name was finally validated by Matsushima (1975), who designated *M. corticola* as the type species. Thirteen taxa are included in the genus, but only nine have validly published names (Index Fungorum 2014; MycoBank 2014; Matsushima 1971, 1975, 1980, 1983, 1987; Kirk 1986; Castañeda-Ruíz & Kendrick 1991; Castañeda-Ruíz et al. 1997).

Mirandina inaequalis fits the genus *Mirandina*, which has brown, erect conidiophores, conidiogenous cells with short-cylindrical denticles towards the apex, and conidia that are colorless or nearly so, cylindrical and long but narrow (Paulus et al. 2003). The material studied is similar to *M. speciosa*, "*M. cylindrospora*," *M. dactylelloides*, and *M. fusiformis* in conidial shape, but *M. speciosa* has aseptate conidia, "*M. cylindrospora*" and *M. dactylelloides* have very short conidiophores, and the denticles of *M. fusiformis* are much denser. *Mirandina inaequalis* is also morphologically similar to *Dactylaria plovercovensis* (Goh & Hyde 1999), *D. triseptata* (Matsushima 1975; Castañeda-Ruíz et al. 1991), and *D. lakebarrinensis* (Hyde & Goh 1998). However, the conidiogenous cells of *D. plovercovensis* have more conspicuous and cylindrical denticles and conidia lack a protuberance at the base. *D. triseptata* conidia are broadly rounded at the apex, without a protuberance at the base. *Dactylaria lakebarrinensis* is most similar to our species; however, it has shorter inconspicuous denticles, the conidiophore apex is broad, and its conidia are olivaceous. In *M. inaequalis* the conidiophore apex is conical and conidia are subhyaline to hyaline. We place the fungus in *Mirandina* rather than *Dactylaria* based on its brownish tapered conidiophores and obclavate to cylindrical

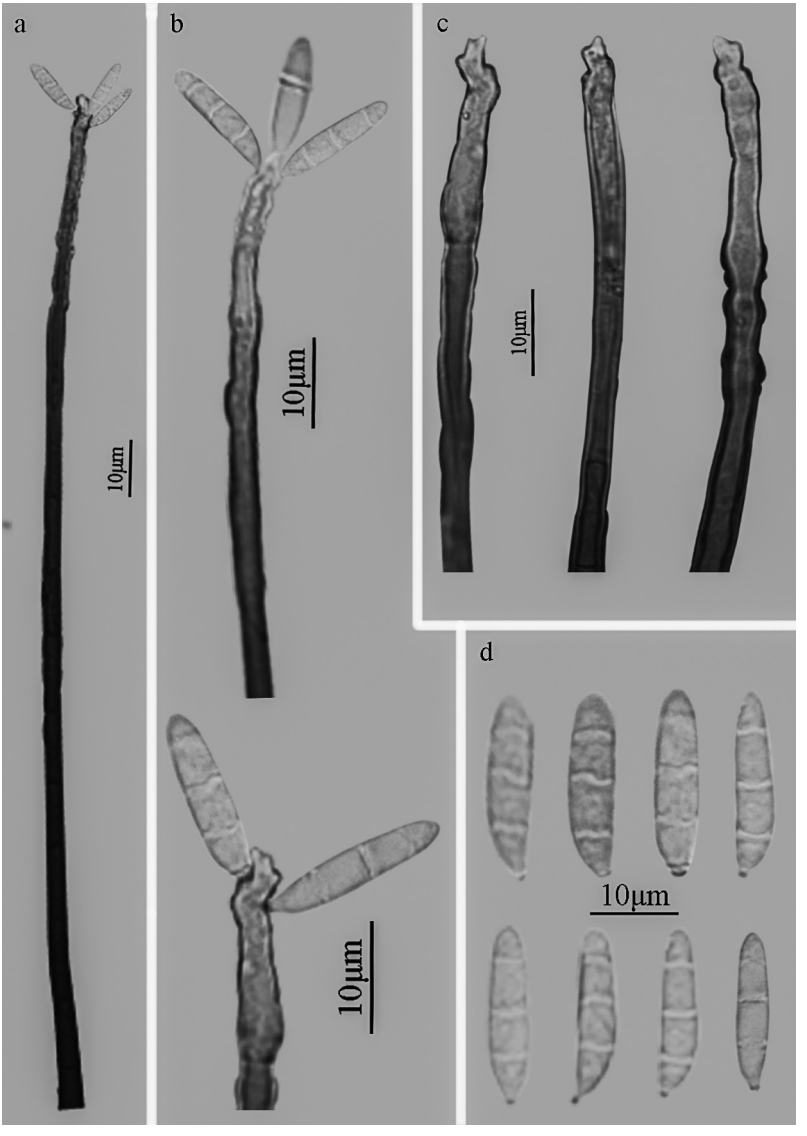

Fig. 2. *Mirandina inaequalis* (holotype, HSAUP H4039). a. Conidiophores and conidia. b. Conidiogenous cells with conidia. c. Conidiophores with denticles. d. Conidia.

conidia (Hoog 1985). Because of the confused relationship between *Mirandina*, *Dactylaria*, and related genera, further work, including the use of molecular tools to classify this complex of fungi, is necessary.

Key to species of *Mirandina*

1. Conidia without septa. 2
1. Conidia with septa 4
2. Conidiogenous cells denticulate, denticles 1–1.5 µm high . . . . . *M. arnaudii*
2. Conidiogenous cells bearing inconspicuous denticles. 3
3. Conidia curved or hooked at base . . . . . *M. fragilis*
3. Conidia falcate, truncate at base . . . . . *M. speciosa*
4. Conidiophores hyaline 5
4. Conidiophores brown. 6
5. Conidia narrowly obclavate, rostrate . . . . . *M. flagelliformis*
5. Conidia narrowly fusiform, without rostrum . . . . . *M. dactylelloides*
6. Conidia pale brown centrally, subhyaline end cells . . . . . *M. taiwanensis*
6. Conidia hyaline 7
7. Conidiogenous loci being scarred. . . . . "*M. cylindrospora*"
7. Conidiogenous loci being denticulate 8
8. Conidiophores without basal septa, conidia long, slender, flexuous . . . . "*M. breviphora*"
8. Conidiophores with basal septa, conidia fusiform 9
9. Conidia more than 6-septa 10
9. Conidia less than 6-septa 11
10. Conidiophores bear a cluster of short-cylindrical denticles 12
10. Distribution of denticles on conidiophores sparse. . . . . ***M. inaequalis***
11. Conidia bigger, 40–60 × 2–3 µm. . . . . "*M. typica*"
11. Conidia smaller, 23.5–38 × 1.5–2 µm. . . . . *M. fusiformis*
12. Conidia sometimes curved . . . . . *M. yushanensis*
12. Conidia straight. . . . . *M. corticola*

Acknowledgments

The authors express gratitude to Dr Eric H.C. McKenzie (Auckland, New Zealand) and Dra Gabriela Heredia (Xalapa, Mexico) for serving as pre-submission reviewers and for their valuable comments and suggestions. This project was supported by the National Natural Science Foundation of China (Nos. 31093440, 31230001) and the Ministry of Science and Technology of the People's Republic of China (Nos. 2006FY120100).

Literature cited

Arnaud G. 1952. Mycologie concrète: genera. Bulletin de la Société Mycologique de France 68: 181–223.

Castañeda-Ruíz RF, Kendrick B. 1991. Ninety-nine conidial fungi from Cuba and three from Canada. University of Waterloo Biology Series 35. 132 p.

Castañeda-Ruíz RF, Guarro J, Figueras MJ, Gené J, Cano J. 1997. More conidial fungi from La Gomera, Canary Islands, Spain. Mycotaxon 65: 121–131.

Castañeda-Ruíz RF, Heredia-Abarca G, Arias RM, Saikawa M, Minter DW, Stadler M. 2007. Anamorphic fungi from submerged plant material: *Phaeomonilia pleiomorpha*, *P. corticola* and *Cacumisporium pleuroconidiophorum*. Mycotaxon 100: 327–336.

Dai YC, Li HJ. 2010. Notes on *Hydnochaete* (*Hymenochaetales*) with a seta-less new species discovered in China. Mycotaxon 111: 481–487. http://dx.doi.org/10.5248/111.481

Dai YC, Cui BK, Yuan HS. 2009. *Trichaptum* (*Basidiomycota*, *Hymenochaetales*) from China with a description of three new species. Mycological Progress 8: 281–287. http://dx.doi.org/10.1007/s11557-009-0598-0

Goh TK, Hyde KD. 1999. Fungi on submerged wood and bamboo in the Plover Cove Reservoir, Hong Kong. Fungal Diversity 3: 57–85.

Goos RD, Pirozynski KA. 1975. Fungi of Barro Colorado Island: new and interesting hyphomycetes. Canadian Journal of Botany 53: 2927–2932.

Hoog GS de. 1985. Taxonomy of the *Dactylaria* complex, IV. *Dactylaria, Neta, Subulispora* and *Scolecobasidium*. Studies in Mycology 26. 1–60.

Hyde KD, Goh TK. 1998. Fungi on submerged wood in Lake Barrine, north Queensland, Australia. Mycological Research 102: 739–749.

Index Fungorum. 2014. http://www.indexfungorum.org/names/Names.asp [Accessed: 21 November 2014].

Kendrick B. 2003. Analysis of morphogenesis in hyphomycetes: new characters derived from considering some conidiophores and conidia as condensed hyphal systems. Canadian Journal of Botany 81: 75–100.

Kirk PM. 1986. New or interesting microfungi XV. Miscellaneous hyphomycetes from the British Isles. Transactions of the British Mycological Society 86: 409–428.

Ma J, Wang Y, O'Neill NR, Zhang XG. 2011. A revision of the genus *Lomaantha*, with the description of a new species. Mycologia 103: 407–410. http://dx.doi.org/10.3852/10-176.

Ma J, Ma LG, Zhang YD, Xia JW, Zhang XG. 2012a. New species and new record of *Solicorynespora* from southern China. Mycotaxon 119: 95–102. http://dx.doi.org/10.5248/119.95

Ma J, Ma LG, Zhang YD, Xia JW, Zhang XG. 2012b. *Acrogenospora hainanensis* sp. nov. and new records of microfungi from southern China. Mycotaxon 120: 59–66. http://dx.doi.org/10.5248/120.59

Matsushima, T. 1971. Microfungi of the Solomon Islands and Papua-New Guinea. Osaka, Japan. 78 p., 217 pl.

Matsushima, T. 1975. Icones Microfungorum a Matsushima Lectorum. Kobe, Japan. 209 p., 415 pl.

Matsushima, T. 1980. Matsushima Mycological Memoirs 1. Kobe, Japan. 82 p.

Matsushima, T. 1983. Matsushima Mycological Memoirs 3. Kobe, Japan. 90 p.

Matsushima, T. 1987. Matsushima Mycological Memoirs 5. Kobe, Japan. 199 p.

Mycobank. 2014. MycoSearch database search. [Accessed: 21 November 2014]. http://www.mycobank.org/Biolomics.aspx?Table=Mycobank&Page=200&ViewMode=Basic

Paulus B, Gadek P, Hyde K. 2003. Two new species of *Dactylaria* (anamorphic fungi) from Australian rainforests and an update of species in *Dactylaria* sensu lato. Fungal Diversity 14: 143–156.

Ren SC, Ma J, Ma LG, Zhang YD, Zhang XG. 2012. *Sativumoides* and *Cladosporiopsis*, two new genera of hyphomycetes from China. Mycological Progress 11: 443–448. http://dx.doi.org/10.1007/s11557-011-0759-9

Zhang K, Ma LG, Zhang XG. 2009. New species and records of *Shrungabeeja* from southern China. Mycologia 101: 573–578. http://dx.doi.org/10.3852/09-006

Zhang YD, Ma J, Ma LG, Zhang XG. 2012. Two new species of *Taeniolina* from southern China. Mycological Progress 11: 71–74. http://dx.doi.org/10.1007/s11557-010-0729-7